AMATEUR SATELLITE REPORT

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AMSAT® NA *Newsletter for the Amateur Radio Space Program*

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Phase 3C Launch Special Edition

Ariane V-23 Launch Success Sets Stage For Phase 3C Launch June 8

Arianespace scored another major success May 17 when an Ariane 2 rocket performed flawlessly in boosting a large geo-synchronous satellite to orbit. Launch took place at 23:58 UTC on the evening of May 17. The V-23 launch success means the decks are cleared for the launch AMSAT is most interested in: the V-22 mission carrying AMSAT's Phase 3C satellite. That's nominally scheduled for the morning of June 8.

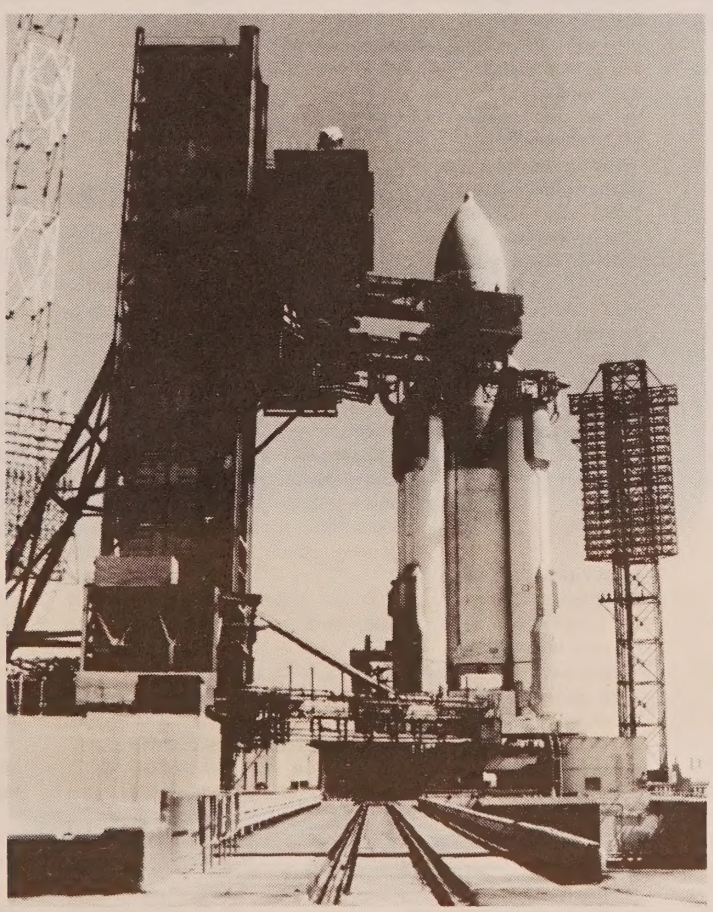
The V-23 mission, an Ariane 2 launcher carrying the Intelsat 5 F13 satellite, apparently performed exactly as expected. The satellite was inserted into its transfer orbit and late in the week was being prepared for kick motor firing and subsequent solar panel deployment.

The launch was broadcast on commercial satellite SPACENET S1, transponder 23. Several AMSAT members reported watching the excitement unfold in real-time. The night launch was visually spectacular as the 6 rocket engines lit up the Kourou night sky. It's hoped the V-22 launch of Phase 3C, which is a morning launch, will also be broadcast. If it is, the broadcast will support the ALINS (AMSAT Launch Information Network Service) planned.

With V-23 off, the next mission up is the V-22 Ariane 4 mission; the first flight for the very large Ariane 4 launcher. V-22 will carry AMSAT's Phase 3C, PANAMSAT and Meteosat as Arianespace attempts to extend the versatility of its launcher fleet. AMSAT's Phase 3C has been fully prepared and is awaiting the actual launch.

In the next few days a joint AMSAT-DL and AMSAT-NA team will return to Kourou for the countdown to launch. The "Team Three" effort is focused on assuring telemetry from the satellite is nominal. A constant stream of telemetry from Phase 3C will alert monitoring engineers if anything untoward occurs in the satellite systems.

In the days immediately following launch an intense effort will begin to precisely locate the satellite using AMSAT-developed techniques and personnel. Phil Karn, KA9Q, and Bob McGwier, N4HY, will employ sophisticated ranging techniques and advanced mathematical analysis comparable to the best available to precisely define the orbital parameters within a few days of launch. Then, when the uncertainties are reduced to acceptable levels, the kick motor will be fired for the first time. This will raise the perigee from a precipitously low 200 km to a more comfortable level. After a series of perhaps 3 burns the orbit will be modified from one having perigee at 200 km to one having a 1500 km perigee. The inclination will be raised from its initial 10 degrees to 57 degrees. The apogee and argument of perigee (36,000 km and 178 degrees respectively) will remain unchanged.



The Soviet Energia launcher, the largest operational launch system, is capable of placing at least 200,000 pounds in low earth orbit. Reliable sources indicate the first test launch of the Soviet's space shuttle will soon occur.

Soviet Shuttle Launch? Nyet!

by Ed O'Grady, KC2ZF

Soviet space observers kept a constant vigil this past week for the rumored launch of the Soviet Space Shuttle, Kosmolyet. As reported here last week, western media groups were invited to the Baikonur Cosmodrome to view a "major space event", to occur on the afternoon of 18 May. The press was notified that they would be at Baikonur for 4 hours and rumors began to spread that it was in fact the long-awaited launch of Kosmolyet, or "space flyer".

The press was invited to tour the Cosmonaut training facility at Star City on Monday and at that time it became apparent that Kosmolyet was still in the testing stages. An interview with one Soviet Space official conducted by ABC News indicated that more testing is necessary before the launch will occur. He also pointed out that the first several flights will be unmanned. This conflicts with repeated statements from Vladimir Shatalov, head of the training facility, who has indicated that it WILL be manned by two cosmonauts. In fact, in an interview with Radio Moscow on Thursday of this past week, Shatalov once again stated that the first flight will be manned. He also said that the flight will not occur until both the shut-

tle and the Energiya, the largest booster rocket ever built, have been thoroughly checked.

The media event of Wednesday turned out to be the launch of Kosmos 1944, an "agricultural/photographic satellite", on board an SL-4 booster. The press were permitted to photograph the launch with their own equipment (a first) and were given a brief tour of the launch facility, including the 15,000 foot shuttle landing facility.

Western analysts were surprised to learn that some 20 atmospheric flights have already taken place with Kosmolyet and "several more are necessary before launch." It is presumed that veteran cosmonauts Igor Volk and Anatoly Levchenko will command the first mission.

In other Soviet space activity, Radio Moscow announced that a press conference was held at Star City, the cosmonaut training facility outside of Moscow, by the crew members of the upcoming joint Soviet-Bulgarian mission to the Soviet Space Station, Mir. The flight, now set for June 7, will carry two Soviet cosmonauts and one Bulgarian guest cosmonaut to Mir to join the two residing cosmonauts, Manarov and Titov. A review of MIR's projected orbits suggests a launch in the range of 1710 UTC (9:10 PM Moscow time) which would indicate significant Soviet TV coverage.

AMSAT Technical Journal *Call For Papers*

The third issue of *AMSAT-NA Technical Journal* is scheduled for publication in late summer 1988. Papers reporting original work and significant findings in the fields of low-cost satellite design, construction, and operation, space communications, space sciences and related social value issues are welcome.

Contributions may be made by a member of any international AMSAT group. Contributions are also welcomed from persons not affiliated with an AMSAT group but with an interest in the Amateur Radio Space Program. Please also remember that *ATJ* does contain articles reprinted from other journals as long as there is general technical interest and permission for reprinting can be obtained. If you know of an article appropriate for reprinting in *ATJ*, please inform the editor at the address below.

Please submit your material both in hardcopy and as a text file on diskette. Any 5 1/4 inch format is acceptable provided the format is clearly indicated on the label. Please be sure that any special character sequences inserted by word processing programs have been deleted from the file. Any required figures should be carefully drawn or produced by computer at least twice the size they are likely to appear in the final publication. Authors are asked to take particular care with respect to the quality of drawings since a great deal of production time is saved when the original artwork is done with care.

Mail your submissions to: Robert J. Diersing, N5AHD, Editor, AMSAT-NA Technical Journal, Computer Science Department, Corpus Christi State University, 6300 Ocean Drive, Corpus Christi, Texas, 78412.

The deadline for the next issue is July 1, 1988. The editor would be most grateful for any early submissions.

Astronaut Tony England, WØORE, To Retire From NASA

Astronaut Tony England, WØORE, whose July 1985 51F shuttle flight brought the "Hams in Space" concept to new heights, has announced his retirement from NASA. He will leave the agency within the next several weeks to take a teaching position at the University of Michigan, Ann Arbor. He cited the stretchout of the shuttle and space station programs and his desire to progress with his own agenda as underpinning his decision to leave the agency.

Dr. England, a geophysicist from North Dakota, had taken Amateur Slow Scan TV with him on his shuttle flight aboard the shuttle Challenger. Aside from an instrumentation anomaly on lift-off that caused an engine to be shut down early, the mission on the ill-fated Challenger was a success. And thousands around the world heard WØORE and many saw the images sent from Tony's SSTV setup. The SSTV beamed up to WØORE from the Johnson Space Center station, W5RRR, were the first live TV pictures ever received aboard shuttle.

Tony told the AMSAT News Service he will be moving to the Ann Arbor area as soon as his affairs can be set in order in Houston where he now resides with his wife Kathy. He will become Professor of Electrical Engineering at U of M's EE department. Tony said he is especially interested in working with AMSAT in future satellite projects and that his work at Michigan will keep him very much involved in space technology. Aside from his teaching duties, he said, he will be doing research in satellite technology especially in the area of remote sensing. Dr. England is a leading world authority on remote sensing and was co-investigatior on the Shuttle Imaging Radar (SIR) experiment which was enormously successful.

Tony said he enjoys teaching and doing research. During a long lull in the U.S. Space Station program early procurement days he had taken a teaching assignment at Rice University in Houston.

With the imminent departure of Dr. England from NASA the next opportunity for continuing the "Ham In Space" program falls to Dr. Ron Parise, WA4SIR, of Silver Spring, Maryland who's a visiting scientist in NASA. Ron's proposed inclusion of a packet radio experiment aboard his ASTRO-1 mission has been delayed while the shuttle program is reorganized following the Challenger accident in January 1986.

Astronaut Dr. Tony England, WØORE, has been a marvelous spokesman for Amateur Radio and a vocal supporter of promoting better education in the space sciences and engineering in general. He's been a superb role model for thousands of students and would-be astronauts throughout the world. And he's brought a rare brand of excitement to the air waves when his callsign could be heard originating in space. AMSAT wishes Tony and his family well in their new assignment in Michigan. We're sure we'll be hearing from WØORE in the future!

Phase 3C PRELIMINARY Telemetry Channel Allocations and Estimated Equations

Telemetry Channel	Function	Typical Equation (Subject to final cal.)	Units
00	Solar panel out and BCR input voltage	n•150	mV
01	70 cm xmtr average power output	$(253-n)^2/2000$	W
02	70 cm rcvr temperature	(n-127)/1.82	C
03	(Reserved)		-
04	BCR output and main battery voltage	(n-10)•75	mV
05	(Special Purpose)	xxxxxxxxxxxx	-
06	2 m xmtr power amplifier temperature	(n-127)/1.82	C
07	+14 volt rail current to xponder	(n-15)•20.64	mA
08	+10 volt regulator voltage	(n-12)•50	mV
09	Helium tank high pressure	(TBD)	Bar
0A	IHU temperature	(n-127)/1.82	C
0B	+14 volt rail current to magnetorquers and antenna relay	(n-15)•4.128	mA
0C	BCR oscillator #1 status	0 = Off; N > 10 = On	-
0D	He tank low side pressure control voltage	(TBD)	-
0E	BCR temperature	(n-127)/1.82	C
0F	+10 volt regulator current	(n-15)•4.128	mA
10	BCR oscillator #2 status	0 = Off; N > 10 = On	-
11	N2O2 tank pressure	(TBD)	Bar
12	SEU temperature	(n-127)/1.82	C
13	Battery charge current	(n-15)•10.32	mA
14	Top (+Z) photocell sun sensor	(See note below)	-
15	Motor valve status	(TBD)	-
16	Auxillary battery #1 temperature	(n-127)/1.82	C
17	Active BCR ouput current	(n-15)•20.64	mA
18	Bottom (-Z) photocell sensor	(See note below)	-
19	S-Band xmtr power output	(TBD)	mW
1A	Auxillary battery #2 temperature	(n-127)/1.82	C
1B	Active BCR input current on 28 volt line	(n-15)•10.32	mA
1C	Spin rate {if n < 139,	r = (139-n)•0.8 + 20	rpm
	or {if n > = 139	r = 508/(n-116)-2	rpm
1D	24 cm rcvr AGC {if n < 100	AGC = 0	dB
	or {if n > = 100	AGC = $(n-100)^2/189$	dB
1E	Main battery temperature	(n-127)/1.82	C
1F	Solar panel #6 current	(n-15)•4.128	mA
20	2m xmtr average power output	$(200-n)^2/2000$	W
21	He tank temperature	(n-127)/1.82	C
22	Solar panel #1 temperature	(n-127)/1.82	C
23	Solar panel #5 current	(n-15)•4.128	mA
24	70 cm rcvr AGC	$(n-83)^2/1000$	dB
25	70 cm xmtr PA temperature	(n-127)/1.82	C
26	Solar panel #3 temperature	(n-127)/1.82	C
27	Solar panel #4 current	(n-15)•4.128	mA
28	Special purpose	xxxxxxxxxxxx	-
29	24 cm rcvr temperature	(n-127)/1.82	C
2A	Solar panel #5 temperature	(n-127)/1.82	C
2B	Solar panel #3 current	(n-15)•4.128	mA
2C	+14 volt regulator voltage	(n-10)•61.5	mV
2D	RUDAK temperature	(n-127)/1.82	C
2E	Top (+Z) skin temperature of arm #1	(n-127)/1.82	C
2F	Solar panel #2 current	(n-15)•4.128	mA
30	Mode B transponder +9 V supply voltage	(n-10)•50	mV
31	Wall temperature in arm #2	(n-127)/1.82	C

32	Bottom (-Z) skin temperature of arm #1	(n-127)/1.82	C
33	Solar panel #1 current	(n-15)•4.128	mA
34	Special purpose	xxxxxxxxxxxx	-
35	Wall temperature in arm #1	(n-127)/1.82	C
36	N2O4 tank temperature	(n-127)/1.82	C
37	Reserved		-
38	Auxillary battery voltage	(n-10)•75	mV
39	Mode S transponder temperature	(n-127)/1.82	C
3A	+Z platform temperature (SERI experiment)	(n-127)/1.82	C
3B	Reserved		-
3C	Mode L transponder +9 V supply voltage	(n-10)•50	mV
3D	AZ-50 tank temperature	(n-127)/1.82	C
3E	Nutation damper temperature	(n-127)/1.82	C
3F	Reserved		

NOTES:

The equation values are preliminary estimates ONLY.
IHU = Integrated Housekeeping Unit; the computer
BCR = Battery Charge Regulator
He = Helium
SEU = Sensor Electronics Unit
N2O4 is nitrogen tetroxide; the propellant oxidizer
AZ-50 is Aerozine 50, the propellant fuel

Notes regarding channels 14 and 18:

These two sensors detect sunlight on the top (+Z) surface and the bottom (-Z) surface of the spacecraft. The provide only a rough indication of sun position and are used to resolve ambiguity in the readings from the sun sensors. When in full sunlight, a count of 65 will result. A count of about 10 is background noise only. The sun is declared present when the count exceeds 20. The main spacecraft solar cell arrays receive maximum illumination when the sun is perpendicular to (normal to) the spin axis (Z-axis). When this condition exists, both the +Z and -Z detectors will yield background readings (10) only. A count of 20 or greater on either indicates misalignment. The higher the count, the greater the misalignment of the spacecraft with respect to the sun angle (beta angle). Source: W3GEY 15Apr86; *ASR* 93, 31Dec84; ZL1AOX 27Jan88.

Phase 3C System Specifications

Part 1: Phase 3 Spacecraft Specifications
Part 2: User Station Requirements
Part 3: Ariane 4 Launcher Characteristics and Launch Site Information
part 3 was previously published in *ASR* #169.

Note: The following preliminary specifications represent the latest and best pre-launch known values for Phase 3C. However, it is understood and assumed some values will CHANGE as better values are obtained or as system changes are made either by intent or by natural processes inherent in component aging, temperature changes, etc.

Part 1: Phase 3 Spacecraft Specifications

1.0 Power system
1.1 Solar Arrays 50 watts at start of life rolling off to about 35 watts after 3 years depending on various factors.
1.2 Batteries: Primary rated at 10 Ah; auxiliary rated at 6 Ah.
1.3 Regulation by a Battery Charge Regulator (BCR)
2.0 Attitude Control and Stabilization
2.1 Type: Spacecraft is a spinner; spins on Z-axis at 10 - 60 rpm
2.2 Control: Attitude and spin rate adjusted magnetically by generation of torque through inter-action of on-board pulsed electro-magnets (magnetorquers) and geo-magnetic field.
2.3 Attitude determination and spin rate detection by two sun sensors (cross slits) and earth sensor inputs to computer.
3.0 Integrated Housekeeping Unit (IHU)
3.1 Operating System: Multitasking computer running IPS system
3.2 CPU: 1802 COSMAC
3.3 Memory: Harris HS-6564RH radiation hardened memory totalling 32 kb of error correcting memory (48 kb total).
4.0 Propulsion
4.1 On-board perigee kick motor (PKM) comprising a liquid-fueled, bi-propellant rocket engine.
4.2 Thrust: 400 N
4.3 Specific Impulse: 293 seconds
4.4 Delta V anticipated with 142 kg spacecraft: 1480 m/s
4.5 Fuel: Aerozine 50; a 50 % blend of un-symmetrical di-methyl hydrazine (UDMH) and hydrazine.
4.6 Oxidizer: Nitrogen tetroxide (N2O2)
4.7 Ignition system: none; hypergolic (self-igniting) fuel employed.
4.8 Pressurization: Helium; 400 Bars high side; 14 Bars low side
5.0 Transponders
5.1 Mode B: 150 kHz wide inverting linear transponder
5.1.1 Frequencies
5.1.1.1 Uplink: 435.420 - 435.570 MHz
5.1.1.2 Downlink: 145.975 - 145.825 MHz
5.1.1.3 Beacons: General 145.812 MHz; Engineering 145.985 MHz
5.1.2 Receive system characteristics
5.1.2.1 Effective system noise temperature: ??? K (NF = ??? dB)
5.1.2.2 Figure of merit: ??? dB/K (with antenna gain of 9.5 dBic)
5.1.3 Transmitter characteristics
5.1.3.1 Power output: 17 dBW (50W) PEP; 11 dBW (12.5W) average
5.1.3.2 Intermodulation ratio (NPR method): -23 dBr
5.1.3.3 Downlink EIRP: 23dBW (200 W) PEP; 17dBW (50 W) avg (with 6 dBic gain)
5.1.3.4 Dow>Z4L->nlink 3 dB beamwidth: Approximately 100 degrees
5.2 Mode JL: 290 kHz wide inverting linear transponder
5.2.1 Frequencies
5.2.1.1 Uplinks: 1) Mode L: 1269.620 - 1269.330 MHz
2) Mode J: 144.425 -144.475 MHz
3) RUDAK: 1269.710 MHz
5.2.1.2 Downlinks: 1) Mode L: 435.715 - 436.005 MHz
2) Mode J: 435.990 - 435.940 MHz
3) RUDAK: 435.677 MHz
5.2.1.3 Beacon: General 435.651 MHz
5.2.2 Receive system characteristics
5.2.2.1 Effective system noise temperature: 260 K (NF = 2.8 dB)
5.2.2.2 Figure of merit: -12 dB/K (with antenna gain of 12.2 dBic)
5.2.3 Transmitter characteristics
5.2.3.1 Power output: 17 dBW (50W) PEP; 11 dBW (12.5W) average
5.2.3.2 Intermodulation ratio (NPR method): -23 dBr
5.2.3.3 Downlink EIRP: 26.5dBW (446W) PEP; 20.5dBW (111W) avg (with 9.5 dBic)
5.2.3.4 Downlink 3 dB beamwidth: 67 degrees
5.3 Mode S: 36 kHz wide hard limiting transponder
5.3.1 Frequencies
5.3.1.1 Uplink: 435.601 - 435.637 MHz
5.2.1.2 Downlink: 2400.711 - 2400.747 MHz
5.3.1.3 Beacon: 2400.325 MHz
5.3.2 Receive system characteristics
5.3.2.1 Effective system noise temperature: (?) (Same as Mode B 70 cm rcvr)
5.3.2.2 Figure of merit: ??? dB/K (With 9.5 dBic antenna gain)
5.3.3 Transmitter characteristics
5.3.3.1 Power output: 0.97 dBW (1.25) watts continuous
5.3.3.2 Downlink EIRP: 14 dBW (25 W) with 13 dBic antenna gain
5.3.3.3 Downlink 3 dB beamwidth: 45 degrees
5.4 RUDAK
5.4.1 Frequencies
5.4.1.1 Uplink: 1269.710 MHz
5.4.1.2 Downlink: 435.677 MHz
5.4.2 Receive system characteristics
5.4.2.1 Effective system noise temperature: 260 K (NF = 2.8 dB)
5.4.2.2 Figure of merit: -12 dB/K
5.4.3 Digital rates
5.4.3.1 Uplink: 2400 bps bi-phase PSK (BPSK) with 7.5 kHz RF capture range
5.4.3.2 Downlink: 400 bps BPSK or 1200 bps NRZI
5.4.3.3 Protocol: AX.25 version 2
6.0 Antenna Systems
6.1 2 meter antennas
6.1.1 2 meter high gain array
6.1.1.1 Type: ZL special; three phased two-element beams
6.1.1.2 Gain: 6.0 dBic
6.1.1.3 3 dB beamwidth: 100 degrees
6.1.1.4 Polarization: RHC
6.1.2 2 meter omni: monopole
6.1.2.1 Type: Monopole
6.1.2.2 Gain: -2.0 dBi
6.1.2.3 Beam pattern: Torroidal concentric with Z-axis
6.1.2.4 Polarization: Linear
6.2 70 cm antennas
6.2.1 70 cm high gain array
6.2.1.1 Type: 3 phased dipoles over ground
6.2.1.2 Gain: 9.5 dBic
6.2.1.3 3 dB beamwidth: 67 degrees
6.2.1.4 Polarization: RHC
6.2.2 70 cm omni
6.2.2.1 Type: Monopole
6.2.2.2 Gain: -2.0 dBi
6.2.2.3 Beam pattern: Torroidal concentric with Z-axis
6.2.3.4 Polarization: Linear
6.3 24 cm antenna
6.3.1 Type: 5 turn helix
6.3.2 Gain: 12.2 dBic
6.3.3 3 dB beamwidth: 49 degrees
6.3.4 Polarization: RHC
6.4 13 cm antenna
6.4.1 Type: 6 turn helix
6.4.2 Gain: 13.0 dBic
6.4.3 3 dB beamwidth: 45 degrees
6.4.4 Polarization: RHC
7.0 Orbital Characteristics (at separation from launcher)
7.1 Geosynchronous Transfer Orbit (GTO)
7.1.1 Perigee Altitude: 222.504 km
7.1.2 Apogee Altitude: 36,076.636 km
7.1.3 Inclination: 9.997 degrees
7.1.4 Argument of Perigee: 178.148 degrees
7.1.5 Ascending Node Longitude: -135.541 degrees/lift-off
7.1.6 True Anomaly: 127.554 degrees
7.1.7 Epoch: Instant of Separation (L +4797.1 sec.)
7.1.8 Spin rate at deployment: 29.47 degrees per second
7.1.9 Separation velocity: 0.590 meters per second

7.2 Objective Phase 3C Orbit (Final orbit after 2 or 3 burns)
7.2.1 Apogee: 36,000 km
7.2.2 Perigee: 1,500 km
7.3 Inclination: Approximately 57 degrees
7.4 Argument of perigee: 178 degrees (determined by launcher)
7.5 Anomalistic period: Approx 662.4 minutes
7.6 Longitude increment: Approx 184.5 deg East per orbit
8.0 Physical Characteristics
8.1 Size
8.1.1 Diameter (Including antennas): 2.00 m
8.1.2 Height: (Including antennas: 1.35 m
8.2 Mass: 142 kg fully fueled
8.3 Mass: (After kick motor firing) 92 kg
9.0 Major Subsystems
9.1 Integrated Housekeeping Unit (IHU)
9.2 Battery Charge Regulator (BCR)
9.3 Liquid Ignition Unit (LIU)
9.4 Propellant Flow Assembly (PFA)
9.5 Mode JL (L) Transponder
9.6 Mode B (U) Transponder
9.7 Mode S Transponder
9.8 RUDAK Transponder
9.9 Sensor Electronics Unit (SEU)
9.10 Sun sensor
9.11 Earth sensors
9.12 Solar Arrays
9.13 Perigee Kick Motor (PKM)
9.14 Propellant tank system
9.15 Helium bottle
9.16 Antenna system
9.17 Magnetorquers
9.18 Batteries
9.19 Safe/Arm system
9.20 Solar Energy Research Institute (SERI) experiment
(End Part 1: Phase 3 Spacecraft Specifications)

Part 2: User Station Requirements

1.0 Mode B
1.1 Uplink requirements:
1.1.1 Frequency: 435.420 - 435.570 MHz
1.1.2 EIRP: 21.5 dBW for 20 dB peak and 10 dB average SNR on downlink
1.1.3 Polarization: RHC
1.1.4 Suitable uplink components: 10 watts to 12 dBic gain antenna
1.2 Downlink requirements:
1.2.1 Frequency: 145.975 - 145.825 MHz + GB @ 145.812 + EB @ 145.985 MHz
1.2.2 Polarization: RHC
1.2.3 Minimum recommended antenna gain: 10 dBic
1.2.4 Maximum receive system effective noise temperature: 625K (NF = 5.0 dB)
1.2.5 Minimum figure of merit: -18 dB/K
2.0 Mode JL
2.1 Uplink requirements:
2.1.1 Frequency: Mode L: 1269.620 - 1269.330 MHz
Mode J: 144.425 - 144.475 MHz
2.1.2 EIRP: Mode L: 25 dBW for 20 dB peak and 10 dB average SNR on downlink
Mode J: 25 dBW for 20 dB peak and 10 dB average SNR on downlink
2.1.3 Polarization: RHC
2.1.4 Suitable uplink components: Mode L: 10 watts to 15 dBic gain antenna
Mode J: 20 watts to 12 dBic gain antenna
2.2 Downlink requirements
2.2.1 Frequency: 435.715 - 436.005 MHz + GB @ 435.651 MHz
2.2.2 Polarization: RHC
2.2.3 Minimum recommended antenna gain: 13 dBic
2.2.4 Maximum receive system effective noise temperature: 290K (NF = 3.0 dB)
2.2.5 Minimum figure of merit: -12 dB/K
3.0 Mode S
3.1 Uplink requirements
3.1.1 Frequency: 435.601 - 435.637 MHz
3.1.2 EIRP: Approx 27 dBW under average Mode B AGC conditions
3.1.3 Polarization: RHC
3.1.4. Suitable uplink components: 25 watts to 13 dBic antenna
3.2 Downlink requirements
3.2.1 Frequency: 2400.711 - 2400.747 MHz + Beacon @ 2400.325 MHz
3.2.2 Polarization: RHC
3.2.3 Minimum recommended antenna gain: 28 dBic
3.2.4 Typical antenna: 1.4 m dish assuming 50% efficiency
3.2.5 Maximum receive system effective noise temperature: 290K (NF = 3.0 dB)
3.2.6 Minimum figure of merit: +3 dB/K
4.0 RUDAK
4.1 Uplink requirements
4.1.1 Frequency: 1269.710 MHz
4.1.2 EIRP: 26 dBW (400 W EIRP)
4.1.3 Typical suitable uplink: 8 watts to 17 dBic antenna
4.1.4 Polarization: RHC
4.2 Downlink requirements:
4.2.1 Frequency: 435.677 MHz
4.2.2 Typical receive antenna gain: 10 dBic for 12 dB Eb/No ratio.
4.2.3 Polarization: RHC
(End Part 2: User Station Requirements)

AMSAT® NA

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Dayton '88: The AEA booth. Seen are (l-r): George Buxton, N7EZJ; Steve Roberts, N4RVE; Mike Lamb, N7ML; Al Chandler, K6RFK.

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